WEEDS IN VEGE

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Preemergence annual weed control in lettuce (Monterey County) with CDEC (Vegedex) incorporated into the soil at 6 lbs per acre (right rows) as compared with check rows (center).

A RECENT ESTIMATE of yearly losses in California vegetable crops totaled $57,000,000. This figure included $19,000,000 used currently for controlling weeds and $38,000,000 for estimated losses due to weed competition. The highest cost per acre was for weed control in onions and peppers. The largest total loss was from weeds in tomatoes, followed by weeds in lettuce and melons.

Results of a recent Agricultural Extension Service survey of 23 counties indicated that 65% of the carrots and onions are currently treated with herbicides (table 1). Over half of the asparagus in the state is also being treated with herbicides. Weeds in tomatoes have resulted in 41% of the acreage being treated.

TABLE 1. TOTAL VEGETABLE CROP ACREAGE SURVEYED AND AVERAGE PER CENT TREATED WITH HERBICIDES IN 1965

Crop	Total acreage in counties surveyed	Average per cent treated with herbicide
Carrots	11,003	65
Onions	12,450	65
Asparagus	55,686	57
Tomatoes	153,960	41
Peppers	22,322	38
Lettuce	100,758	25
Beans	56,168	16
Potatoes	64,248	16
Spinach	50,290	16
Cole crops	35,976	5
Sweet Corn	6,606	2
Melons	29,150	0

Thirty-eight per cent of the acreage in the high-cost crop of peppers was treated in 1965.

Of the herbicides currently being used in various crops (table 2), weed control results vary from poor to quite satisfactory. (Not all of the herbicides listed in the table are recommended by University of California.) However, the large number of herbicides being used in a number of crops would indicate a wide range of problems and/or inadequate weed control with some herbicides.

Annual weeds

Weeds causing the most problems in vegetable crops are generally annuals such as lambsquarter, pigweed, and barnyardgrass (table 3). Other broadleaf annuals of importance were mustard, malva, or cheeseweed, common nettle, purslane, shepherds purse and nightshade. Annual grasses such as blue grass and rye grass are problems during the winter months as well as is volunteer barley, although not listed here (table 3). Of the perennial weeds, nutsedge (nutgrass) and bermudagrass appear to be somewhat more important than bindweed and johnsongrass. All the weeds listed here are problems of considerable importance in comparison to the many other weeds that frequently occur in vegetable crops, but do not appear in the results of the survey.

Natural enemies

Each vegetable crop has its own array of natural weed enemies (table 4). For example, tomatoes can generally be expected to be infested with pigweed,

Preemergence annual weed control test in carrots (Kern was treated (center of photo). Note adjacent untreated nual weeds. Linuron is not yet recommended by the Univ

CALIFORNIA
ETABLE CROPS

vey of problems
ierbicide possibilities

A. H. LANGE

Postemergence annual weed control in young onions with 8 gallons of sulphuric acid in 80 gallons of water per acre. Photo was taken in San Bernardino County, 36 hours after spray application.

lambsquarter, barnyardgrass, purslane, and in some cases, bindweed. Depending on the season of the year and the location, lettuce is plagued with pigweed, purslane, lambsquarter, barnyardgrass, mustard and many more weeds.

With the perennial nature of asparagus, bermudagrass inevitably becomes a pest in most plantings. Bindweed, pigweed, nutsedge, chickweed, as well as many other weeds, can also be serious problems in the culture of asparagus. In the growing of melon, lambsquarter, pigweed, and a number of other broadleaf weeds are frequently problems in the seed row early in the season, whereas predominantly annual grasses make up the problem in the furrow later in the season.

The many weeds infesting onion plantings can greatly reduce the stand and eventual yield. Such weeds as pigweed, lambsquarter, mustard, annual grasses, and shepherds purse, to mention a few, are extremely costly when hand weeding is required. Early competition from pigweed, barnyardgrass, and nutsedge in corn can not only greatly delay the harvest, but can also drastically reduce yields of this vegetable crop.

County) with Linuron (Lorox) at 1 lb per acre. A single bed areas with heavy stands of London Rockett and other an- ersity of California.

More acreage

This survey has done a great deal to record a "bench mark" of weed control in 1965. Many of the crops now generally treated with herbicides will have more acreage treated in the future. New and better herbicides are continually being developed and a similar survey 10 years from now might show very few of the present herbicides still being used. The trend is toward more selective herbicides, and combinations of these herbicides, to control the varied weed species that may occur from one location to another, and one season to another. Some crops such as melon, with no commercial acreage treated in 1965, could shift to complete treatment in a few years, if the cost of hand weeding continues to increase as it has in the past.

The currently used herbicides in vegetable crops now clearly indicate that this

TABLE 2. HERBICIDES, RATES, AND GENERAL EVALUATION IN CALIFORNIA VEGETABLE CROPS SURVEY†

Crop	Herbicide	lb/A	Effectiveness of herbicide*
Tomatoes	Diphenamid	2–6	7
	CDEC	4	6
	Tillam	4, 5	7
	Trifluralin	3/4	9
Lettuce	CDEC	4, 6	6
	IPC	6	6
	DCPA	6–7½	8
	Benefin	1	–
Asparagus	Monuron	1.6–5	8
	Simazine	2–5	8
	2,4-D	½	5
	Oil	–	9
	Dalapon	10	6
Potatoes	2,4-D	1	5
	Prometryne	1.6–2.4	9
	DNBP + Diesel	–	9
	EPTC	3–6	7
	Linuron	1	9
	DCPA	6–8	8
Carrots	Oil	60 gal.	8
	Carrot Oil	50–100 gal.	8
	Linuron	1	9
Onions	Sulfuric Acid	4%–8 lb.	7
	Dinitro	1–2	10
	KOCN	12–18	5
	DCPA	7.5–12	7
	CDAA	6 qt.	5
Spinach	Monuron	1	8
	Calcium Cyanamid	700 lb	7
Peppers	Diphenamid	2–5	8
Cole crops	CDEC	4–6	6
	CIPC	3	7
	DCPA	–	8
Beans	Trifluralin	3/4–1	7
	DCPA	6	7
	EPTC	3	6
Sweet Corn	Atrazine	1	6

* Average ratings of 0 to 10 (0 = no good, 5 = some weed control, 7 = commercial weed control, 10 = perfect weed control).

† Not all materials listed here are recommended by the University of California. See U. C. Weed Control Recommendations, 1966.

method of weed control is practical and has great potential in the age-old problem of removing weeds selectively from vegetable crops.

Arthur H. Lange is Extension Weed Control Specialist, University of California, Riverside. Many vegetable crop farm advisors and vegetable crop specialists cooperated in conducting this survey.

TABLE 3. SUMMARY—OVERALL WEED PROBLEM IN CALIFORNIA VEGETABLE CROPS

Problem Weeds	No. of Times Each Apeared on List of 5 Most Important Weeds
Lambsquarter	13
Pigweed	12
Barnyardgrass	9
Mustard	5
Annualgrass	4
Malva	4
Nutsedge	3
Bermudagrass	3
Nettle	3
Purslane	3
Shepherds Purse	3
Nightshade	3
Annual Bluegrass	2
Annual Ryegrass	2
Bindweed	2
Groundsel	2
Puncture Vine	2
Chickweed	2
Johnsongrass	1
Peppergrass	1
Miner's Lettuce	1
Foxtail	1
Oxalis	1
Sandbur	1
London Rocket	1
Fiddleneck	1

TABLE 4. SUMMARY, FIVE IMPORTANT WEEDS OF EACH CROP

Crop	Five Important Weeds
Tomatoes	Pigweed, Lambsquarter, Barnyardgrass, Purslane, Bindweed
Lettuce	Pigweed, Purslane, Lambsquarter, Barnyardgrass, Mustard
Potatoes	Pigweed, Lambsquarter, Nutsedge, Barnyardgrass, Bermudagrass
Asparagus	Bermudagrass, Bindweed, Pigweed, Nutsedge, Chickweed
Melons	Lambsquarter, Pigweed, Barnyardgrass, Annual Grasses, Mustard
Celery	Nettle, Lambsquarter, Malva, London Rocket, Nightshade
Onions	Pigweed, Lambsquarter, Mustard, Annual Grasses, Shepherds Purse
Peppers	Pigweed, Lambsquarter, Barnyardgrass, Annual Grasses, Johnsongrass
Broccoli	Nettle, Shepherds Purse, Pigweed, Lambsquarter, Graundsel
Brussel Sprouts	Annual Rye Grass, Nightshade, Malva, Groundsel, Mustard
Beans	Pigweed, Lambsquarter, Barnyardgrass, Purslane, Nightshade
Sweet Corn	Pigweed, Barnyardgrass, Lambsquarter, Annual Grasses, Nutsedge
Peas	Miner's Lettuce, Annual Bluegrass, Fiddleneck, Pepper Grass, Chickweed
Sweet Potatoes	Puncture Vine, Bermudagrass, Barnyardgrass, Sandbur, Lambsquarter
Artichokes	Mustard, Oxalis, Malva, Annual Rye Grass, Nettle
Garlic	Pigweed, Lambsquarter, Malva, Foxtail, Barnyardgrass
Cantaloupe	Puncture Vine, Annual Bluegrass, Pigweed, Shepherds Purse, Lambsquarter

DDT accumulated over the past 20 years was detected in 22 of 23 pear orchard soils sampled in this Lake County survey. Two-thirds of the DDT was found in the top 6 inches of soil and 94% in the upper 12 inches of soil. Most pear roots in cultivated orchard soils are concentrated between the 1- and 4-ft depths.

DDT, . . . a

R. H. GRIPP • K. RYUGO

PEAR DECLINE has been on the increase in Lake County since 1961. Mature Bartlett pear trees, especially those grafted on oriental rootstocks which are lacking in vigor, are probably afflicted with this disease transmitted by the insect vector, pear psylla (*Psylla pyricola*, Foerester). However, with nationwide attention focused on the increased use of pesticides in agriculture, there have been questions as to whether some of these compounds exert the same devitalizing influence on pear trees as on other woody and herbaceous species. The average pear grower has applied at least two sprays of DDT annually for nearly 20 years. Figuring the recommended rate of application (which has been 2 lbs of 50% wettable powder per 100 gallons of water) and the gallonage required by different orchardists to adequately control codling moths (*Carpocapsa pomonella* Linn.), it has been estimated that between 100 and 300 lbs of actual DDT per acre have been applied since this insecticide was introduced commercially. This survey was conducted to determine the level of DDT residue in pear orchard soils in Lake County—as a part of the overall pear decline research program.

The Bartlett pear orchards picked at random for the tests had been bearing commercial crops over 20 years. Of the 23 test sites selected, 14 were located in the Big Valley basin; eight in Scotts Valley, and one near Upper Lake. The soil was sampled at a predetermined location within each orchard (within the drip line of the fourth tree in the fourth row from the northeast corner of the planting). Soil samples were collected at the following four depths: 0 to 6 inches, 6 to 12 inches, 12 to 24 inches and 24 to 36 inches. Five grams of soil from each sample were extracted with three 20 ml aliquots of n-hexane which were filtered, combined, dried, and brought to a uniform volume. The DDT concentration in the soil extract

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